



Electron Beam Welder for Advanced Instrumentation Fabrication

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ABSTRACT:

Procuring a state-of-the-art electron-beam (EB) welder system (BEAMER 312 with a 12-inch cube chamber) from Electron Beam Engineering Services, LLC will enable researchers at the High Temperature Test Laboratory (HTTL) at the Idaho National Laboratory (INL) to fabricate unique sensors critical to advance nuclear technology and competitiveness. This crosscutting technology directly supports the Department of Energy Office of Nuclear Energy's (DOE-NE) mission to attract and teach high-quality students interested in the latest technology and directly enhances research and development performance.

HTTL efforts to develop enhanced instrumentation for high performance materials testing reactors (MTRs) in the United States were initiated as part of the 2007 launch of the Advanced Test Reactor (ATR) National Scientific User Facility (NSUF). Over the last 8 years, HTTL researchers have successfully developed and deployed a large number of sensors to support irradiation testing required for several DOE-NE programs including the ATR NSUF, the Fuel Cycle Research and Development (FCRD), the Nuclear Energy Enabling Technology (NEET), the Next Generation Nuclear Plant (NGNP), and the Transient Reactor Test (TREAT) facility (upon restart). Experienced researchers complete sensor design, fabrication, and evaluation activities to support irradiations at United States and international MTRs (i.e., ATR and ATR Critical facility located at INL and other MTRs participating in the ATR NSUF including the Massachusetts Institute of Technology Research Reactor and international collaborating MTRs, such as the Halden Boiling Water Reactor).

Efforts are underway to expand HTTL activities to include additional DOE-NE applications such as accident tolerant instrumentation and spent fuel storage cask demonstrations. However, development and deployment of ever-increasingly complex and sophisticated sensors in harsh, high temperature, irradiation environments necessitates fabrication capabilities that can only be achieved using the superior advantages offered by this EB welding system.

Although the HTTL includes a wide range of sensor fabrication and evaluation equipment, an EB welding system capability is specifically essential to fabricate the sophisticated sensors being developed to meet DOE-NE program requirements for high accuracy and resolution data to validate new modeling and simulation tools. The enhanced fabrication capabilities associated with this EB welding system would significantly advance ongoing HTTL sensor development and deployment efforts supporting ATR NSUF, NEET, NGNP, FCRD, TREAT, and other DOE-NE programs.